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THE PLANT DISEASE REPORTER

Issued By

Division of Mycology and Disease Survey

Volume XX Number 22

December 15, 1936.

BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY

DIVISION OF MYCOLOGY AND DISEASE SURVEY

Vol. XX Number 22

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This issue of the Plant Disease Reporter concludes Volume 20, with the exception of the index, which will be mailed in due time.

The staff desires to take advantage of this occasion to express its sincere appreciation for the interest and support which has been accorded it during the past year by so large a number of contributors. The items submitted have been of much current interest as well as furnishing a record of continuing value.

Our editor, Miss Wood, and the Reporter's composing room, manned by our stenographer, typist, stencil cutter, and all around assistant, Miss Keach, are devoting all the time which can be spared from more pressing responsibilities to preparing stencils for the summary of plant disease occurrences in 1935, which it is hoped will be issued early in January.

Looking forward to 1937, we are happy to report a gratifying number of responses already received to our calls both for the 1936 crop loss estimates and the 1936 annual reports of disease occurrences. It is our ambition to issue the 1936 crop loss estimates as early as the production figures for that year are available, and to follow it with the annual summary during the spring or early summer. If we could have the crop loss estimate sheets not already returned, by January 15, and the annual report cards from all collaborators and contributors not later than February, I believe this objective could be realized.

Please send in your reports as early as you can, and bear in mind that all items are of interest. Brief notes and summaries of the past season's observations make interesting items for the readers of the Reporter during the winter months, and contributions of this sort are always welcome. H. A. Edson.

A COTTON WILT SURVEY IN THE GEORGIA COASTAL PLAIN AREA IN 1936

A. L. Smith and H. W. Rankin

During the month of July, 1936, a field survey was undertaken to determine the amount of loss to cotton farmers in the Georgia Coastal Plain due to cotton wilt caused by *Fusarium vainfectum*. Eight counties were selected on the basis of their geographical location and soil types.

Certain difficulties were encountered which tended to hide the real amount of wilt in a given field. For example, a field planted with a wilt-resistant variety of cotton may show very little of the disease while if it had been planted with a susceptible variety the loss would have been heavy. Again, on many farms operated by tenants or share croppers the farmer is often completely ignorant as to the variety planted or the past history of the farm. Also, on many farms where the growers state that they have planted a certain variety for a number of years, the seed has become so mixed with other seed at the gins that the crop actually raised is of a

mongrel nature and its wilt-resistant qualities are a question mark. In some counties where wilt-resistant varieties have become well established this tends to raise the average resistance to wilt in the community while in other places where the reverse is true, the resistance may be lowered. Because of all these factors most of the fields examined were planted in non-wilt resistant varieties though a few with the resistant types were also inspected.

In all cases, counts were made in various parts of the field and averaged to obtain the final figure. It is recognized that the data is not absolutely correct. Sometimes it is too high and sometimes too low, but on the whole a rather fair picture is probably given.

In figuring the total loss to farmers in bales the data obtained by Mr. E. C. Westbrook, Cotton and Tobacco Specialist, were used. This has been published in Georgia Agricultural Extension Bulletin No. 456, under the title "A Survey of the Varieties of Cotton Grown in Georgia in 1935." The loss in income is based on data from the Georgia Crop Reporting Service, D. L. Floyd, Statistician in Charge. All of this data is up-to-date and of reasonable accuracy.

Using these data with the wilt survey data, we find that Georgia farmers in the Coastal Plain area lost approximately 57,684 five hundred pound bales of cotton in 1936 with a money value of lint and seed of roughly $4,500,000.

On farms where a record of preceding crops was obtained, it was found that on 24 farms on which it has been the practice to plant cotton continuously on the same land, the average loss from wilt amounted to 9.9 percent. On 26 farms where cotton was planted in rotation with other crops the average loss was 10.9 percent.

Another important point brought out in the survey is that of the 65 farms visited, some wilt was found on 62. On each of the other three, wilt-resistant varieties were grown and on two of these, the operators stated they were grown because the wilt disease was so severe in their fields that planting a non-wilt-resistant variety was unprofitable. The one field showing no wilt was new land planted with a wilt-resistant variety. On some farms the amount of loss was slight and on others it was heavy but it is evident that wilt is present to some extent in most of the cotton fields of the Georgia Coastal Plain. Dixie Triumph did not live up to its name as a wilt-resistant cotton.

Table 36 shows the location, variety, soil type, and percentage of wilt for each farm included in the survey.

Table 37 is a summary of Table 36. No summary of the amount of wilt occurring in each soil type has been included because of lack of data.

Table 36. Location, variety, and percentage of wilt in cotton fields examined in the Georgia Coastal Plain area, 1936. Farms by Counties showing variety and percentage of wilt. The soil was Norfolk sandy loam except where indicated in footnotes.

County	Variety	Per-cent wilt
Bulloch	Half & Half	17.0
	Half & Half	17.0
	Half & Half	6.0
	Half & Half	6.0
	Half & Half	5.0
	Dixie Triumph	8.0
	Coker's Super 7	15.0
	"Just Cotton"	22.0
Crisp	Dixie Triumph Strain #5	Trace
	*Dixie Triumph	2.0
	*Dixie Triumph Strain #5	27.0
	Farm Relief	3.5
	Farm Relief	1.0
	*Petty's Toole	1.0
	Rain's Improved	0.0
Decatur	Stoneville #2	14.0
	Stoneville #2	Trace
	Dixie Triumph	2.0
	Vandiver's Heavy Fruiter	41.0
	Cooks 912	0.0
	Dixie Rose	7.5
Lowndes	Wannamaker's Cleveland	17.0
	Wannamaker's Cleveland	2.0
	Wannamaker's Cleveland	15.0
	Wannamaker's Cleveland	17.5
	*Wannamaker's Cleveland	7.5
	Wannamaker's Cleveland	7.5
	Wannamaker's Cleveland	7.5
	Seabrook (Sea Island)	Trace
	"Just Cotton"	10.0
Pierce	Stoneville #2	1.0
	Stoneville #2	Trace
	*Sykes	15.0
	Half & Half	12.0
	Cleveland Big Boll	1.5
Pulaski	Farm Relief	3.0
	Farm Relief	4.0
	Farm Relief	2.0
	Farm Relief	4.0
	Farm Relief	5.0
	Farm Relief	Trace
Randolph	**Sykes	2.0
	°Sykes	Trace
	+Toole (Gin Run)	11.0
	+Toole	Trace
	+Covington Toole	Trace
	+Covington Toole	Trace
	+Toole	Trace
	+Clevewilt	0
	*Wilson W. R.	1.0
	°Rucker	45.0
	°Stoneville #2	7.5
	°D. & P. L.	3.5
Telfair	Imp. Half & Half	25.0
	Half & Half	37.5
	Dixie Triumph	1.5
	Dixie Triumph	7.5
	Dixie Triumph Strain #2	30.0
	Dixie Triumph	1.5
	Stoneville #2	5.0
	Toole	3.0
	Farm Relief	20.0
	Qualla	8.0
	Bowden 40	19.0
	"Just Cotton"	12.0

*Tifton sandy loam
**Greenville sandy loam
°Greenville sandy clay loam
+Orangeburg sandy loam

Table 37. Percentage of wilt in cotton varieties grown in fields examined in the Georgia Coastal Plain, 1936.

Variety	Number of Farms	Percentage of Wilt
Dixie Triumph	9	8.84
Farm Relief	9	4.70
Half & Half	8	15.70
Wannamaker's Cleveland	7	10.7
Toole	7	2.2
Stoneville #2	6	4.6
"Just Cotton"	3	14.7
Sykes	3	5.7
Vandiver's Heavy Fruiter	1	41.0
Dixie Rose	1	7.5
Seabrook (Sea Island)	1	0.1
Cook's 912	1	0.0
Coker's Super 7	1	15.0
Cleveland Big Boll	1	1.5
Qualla	1	8.0
Rowden 40	1	10.0
Wilson W. R.	1	1.0
Clevewilt	1	0.0
D. & P. L.	1	3.5
Rucker	1	45.0
Rain's Improved	1	0.0

Table 38. The percentages of wilted plants, rank in wilt resistance, yield and rank in yield of different cotton varieties and hybrids grown in wilt-plot at Carnegie, Georgia, 1936. Data are averages of six series.

Variety or Hybrid	Percentage* of wilted plants	Varietal rank in wilt resistance	Acre yield of seed cotton	Varietal rank in yield of seed cotton
	Percent		Pounds	
Rhyne's Cook	0.9	1	1033.0	2
Cook 12-142	1.0	2	979.1	5
Clevewilt x R. Cook 2-1	1.1	3	836.4	15
Clevewilt x R. Cook 1-1	1.1	4	817.3	16
Clevewilt x R. Cook 1-2	1.3	5	858.6	13
Rhyne's Clevewilt	1.8	6	1045.4	1
Petty's Toole	2.1	7	1012.2	3
Petty's Toole	2.3	8	954.2	7
Cook 144-133	2.4	9	883.7	12
Dixie Triumph 759-06	2.8	10	983.2	4
Cook 1627-R4	3.0	11	937.6	10
Cook 1006	3.1	12	954.2	8
Coker's Clevewilt 6	3.3	13	945.9	9
W. W. W. Dixie Triumph	3.7	14	788.2	20
W. W. W. Cleveland B. B.	3.9	15	900.3	11
W. W. W. Cleveland W. R.	4.7	16	734.3	21
Stoneville 5A	6.2	17	854.6	14
Half and Half (Hi-bred)	7.4	18	688.7	24
D. & P. L. 11A	7.5	19	622.3	26
Stoneville 5	8.6	20	807.9	18
Stoneville 2B	9.7	21	958.3	6
Farm Relief (Cokers)	9.7	22	721.8	22
Stoneville 2A	14.1	23	721.5	23
Stoneville 370-930-01	14.4	24	796.5	19
Piedmont Cleveland	22.9	25	809.0	17
Half and Half (old)	23.6	26	638.9	25
D. & P. L. 11	41.2	27	381.2	27
Average of all Check Rows (Farm Relief):	23.8			

*Percentages corrected by comparison with check plots. The mean of the wilted plants for all check plots was multiplied by the variety mean and the product divided by the mean for the 6 check plots adjacent to that variety.

Table 38 gives the results of comparative variety tests conducted by Dr. Smith near Carnegie in Randolph County. (College of Agriculture, University of Georgia).

COTTON DISEASES IN NORTH CAROLINA DURING THE SEASON OF 1936

Luther Shaw

Damping-off: Demonstrations on the control of damping-off of cotton by seed treatment with 2 percent Ceresan were conducted on a total of 67 farms distributed through 11 counties in North Carolina during the season of 1936. Records were made of the stands of cotton obtained, the percentages of plants killed by damping-off fungi, percentages of plants attacked but not killed by damping-off fungi, and the yield of cotton from plots planted with treated and untreated seed. Averages of the results obtained in these tests are given in Table 39.

Table 39. Losses from damping-off of cotton on 67 farms in North Carolina where treated and untreated seed were planted, 1936.

Factors Measured	Seed Treated	Seed not treated
Average number plants emerged per 100 ft. of row	416	248
Average percentage of plants attacked but not killed by damping-off fungi	10	78
Average percentages of plants killed by damping-off fungi	1	9
Average number of plants per 100 ft. of row at picking time	137	106
Average yield of seed cotton per acre in lbs.	1548	1295
Average value of lint and seed in dollars per acre 1/	$81.71	$68.36

1/ Lint valued at $12 per hundred, and seed at $30 per ton.

The results given in Table 39 show that there was an average difference in yield from treated and untreated seed of 253 pounds of seed cotton valued at $13.35 per acre in favor of treated seed. The evidence indicated that the difference in yield was due primarily to a difference in stand, and that the difference in stand was caused primarily by damping-off fungi.

Approximately 915,000 acres of cotton were planted in North Carolina in 1936. Of this acreage approximately 24,000 acres were planted with treated seed, and 891,000 acres with untreated seed. The average yield of seed cotton per acre for the State is approximately 760 pounds. The figures given in table 39 show that there was approximately a 16 percent reduction in yield of cotton when untreated seed were planted. Hence, if there had been no damping-off the yield should have been approximately 910 pounds of seed cotton per acre.

Using the above figures as a basis, it is calculated that on the 891,000 acres planted with untreated seed in North Carolina during the season of 1936, damping-off caused a reduction in yield of approximately 133,650,000 pounds of seed cotton, valued at about $7,056,720.

Fusarium wilt: Fusarium vasinfectum is present in the soils on a large number of farms especially in the eastern counties of the State. The practice of growing wilt-resistant varieties on these soils is well established in the area. However, there is still a substantial number of farms not planting wilt-resistant varieties on land that has harbored the wilt organism for a number of years. In addition, the disease annually develops on farms where it had not previously occurred. General observations indicate that the losses on these farms were heavy during the season of 1936, but there is no complete record of the number of farms on which losses from wilt occurred.

Ascochyta blight, caused by Ascochyta gossypii, was found in only one cotton field in North Carolina during the season of 1936. This was in Sampson County, and the disease destroyed approximately one-half of one acre of cotton.

Angular leafspot, caused by Bacterium malvacearum, was unusually prevalent in North Carolina during the current season. The disease assumed epidemic proportions following the rainy period in July. In the latter part of this month, the disease was present in practically all cotton fields in the State and caused a considerable amount of defoliation in approximately 10 percent of the fields. The effect of this defoliation on the subsequent yield was not determined; however, without question some reduction in yield resulted. (North Carolina Agricultural Experiment Station).

ROOT ROT ON PEANUTS IN NORTH CAROLINA IN 1936

Luther Shaw

In late September a general survey was made for root rot diseases of peanuts in the northeastern part of the State. Ten farms, distributed through five counties with a total of 250 acres of peanuts were visited and detailed records were made on the prevalence of root rot. The percentages of the vines killed by root rot varied from 2 to 34. The average for the ten farms was 18.3 percent. On one farm the peanuts were being dug when the visit was made. A count that had been made on this farm before the vines were dug indicated a 16 percent infection with root rot. On the same farm examination of the plants after digging showed that the nuts were completely destroyed on 25 percent. It would seem that the percentage of plants showing top symptoms does not give a complete indication

of losses from root rots on peanuts. From the figures obtained it can safely be estimated that the total loss from root rot on these farms amounted to approximately 50,325 pounds of nuts. If the nuts are valued at 3.5¢ per pound the loss was $1761.37, or an average of $7.05 per acre.

Observations indicated that the losses from root rot for the entire peanut area was not so great as that on the ten farms surveyed. However, indications are that root rot caused approximately a 5 percent reduction in the peanut crop during the season of 1936.

The primary causal agent of root rot on peanuts in North Carolina has not been definitely determined. It has been assumed that Sclerotium rolfsii is the major causal agent, however, there exists a definite possibility that certain species of Rhizoctonia and Pythium may have a part in the complex. Work is now in progress at this Station to determine the possible rôle of different organisms as causal agents of the disease. (North Carolina Agricultural Experiment Station).

OCCURRENCE OF BACTERIAL WILT IN FALL PLANTINGS OF POTATOES AND EGGPLANTS IN FLORIDA

A. H. Eddins

On November 13, 1936, bacterial wilt (Bacterium solanacearum) was present in white potato and eggplant fields in the vicinity of Arcadia, DeSoto County, Florida. The crops affected had been planted during September and the disease had killed from 10 to 75 percent of the potato plants. The disease had also killed 20 percent of the eggplant plants in one field of three acres. Fall plantings of these two crops in DeSoto County probably do not exceed 300 acres, but the occurrence of the disease in widely scattered fields indicates that the Leon fine sand, the prevailing soil type of DeSoto County, is generally infested with the bacterial wilt organism, and that the disease will develop whenever the soil temperature is favorable.

By November 20 bacterial wilt had almost completely destroyed four acres of eggplants in Alachua County near Gainesville. On this date the disease had killed 75 percent of the plants and only eighteen hampers of fruit had been picked.

The appearance of bacterial wilt in fall-grown crops now establishes the fact that this disease may occur from March to November in susceptible crops planted in infested soil in Florida. Prior to this year, records showed that the disease occurred only during the spring and summer months. (Florida Agricultural Experiment Station).

TOMATO DISEASE NOTES FOR GEORGIA FOR 1936

J. H. Miller

The Seedling Plant Industry

The plant area was located near Cairo, Tifton, Valdosta, Albany, and Pembroke. The seed are usually planted in February, and plants are shipped north beginning in April and continuing through May. This year the unusual weather conditions retarded both seed planting and disease appearance somewhat. The table below shows monthly weather data for 1935 and 1936 from the U. S. Weather Stations nearest to the above cities.

Table 40. Monthly temperature and rainfall data for five Georgia stations in the tomato seedling plant area, 1935 and 1936.

Place	Year	Average temperatures of				Total rainfall in inches			
		Feb.	Mar.	Apr.	May	Feb.	Mar.	Apr.	May
Brooklet	1935	52.6	65.2	68.6	75.2	2.39	3.01	1.57	1.21
	1936	49.2	61.8	66.0	75.2	3.86	2.82	5.57	1.43
Waycross	1935	55.6	67.5	70.2	77.2	3.55	1.63	2.65	2.83
	1936	51.9	63.8	67.6	75.6	7.30	3.08	3.64	2.94
Quitman	1935	53.8	66.7	69.0	75.5	5.63	3.78	3.02	4.87
	1936	51.0	64.7	67.2	75.0	5.88	2.15	2.70	4.41
Tifton	1935	52.4	64.0	67.2	74.8	5.15	2.61	2.53	2.78
	1936	48.4	60.8	64.5	74.4	5.18	3.17	7.87	1.40
Thomasville	1935	54.0	64.6	67.3	74.0	4.88	3.28	4.31	5.21
	1936	50.6	63.0	66.1	74.3	7.18	3.15	4.99	3.66

Heavy rains and cold weather necessitated planting in March, and soon after the plants were up heavy winds sweeping sand over the fields, cut down or covered up many acres at Tifton and caused some damage at Valdosta, but none at Pembroke. There was much replanting in the Tifton area. No relation was noticed between the sand bruises and the collar-rot appearing later.

In 1935 there was about 30 percent of rejections for disease, and there seemed to be some correlation between this incidence and the amount of rainfall. The districts with the heaviest rainfall showed most early blight as well as bacterial spot. This year for the first time, the State Entomologist required seed treatment and the total disease rejections were less than 2 percent and were correlated entirely with the character of the seed treatment, and not with the amount of rainfall.

The seed treatment was done for the most part in the North by the seed companies. Mercuric chloride was generally used, and where the treatment had been applied during the growing season it was repeated in the winter. Zinc oxide or monohydrated copper sulphate was applied after the mercuric chloride solution to a few seed lots. In uncertified fields, with a few exceptions, the seed were also treated.

In the certified fields about 50 percent of the land was previously in pines and the rest in cotton, corn, or grass. Some of the uncertified acreage had been in tomatoes in 1935. This provided a comparison of evidence for disease holdover as well as seed carriage.

As in previous years the seed-borne diseases that cause the most serious losses are early blight and bacterial spot, while the local or soil-borne ones are root-knot and bacterial wilt. The bacterial canker, Septoria blight, Fusarium wilt, Phoma rot, and anthracnose can be seed-borne, but do not usually show up in the seedling stage. Also virus diseases never appear in this stage in Georgia.

Early blight and collar-rot (Alternaria solani): This is usually the most serious seedling disease, and any amount of the collar-rot phase is cause for rejection. It appeared first in a 100-acre field near Tifton about April 20, and at the same time in a large field near Pembroke both on new land. Two weeks later both collar-rot and leafspot were general and both fields were rejected. The field near Tifton was on rolling land with a stream running through it. There was just as much disease on high spots in this field as near the stream. Infection appeared in small centers spreading a few inches each way. Three Bordeaux sprays were applied with a power sprayer, beginning with the appearance of the first rough leaves, but there was no noticeable control, either of the early blight or of the collar rot. The seed had been treated twice with mercuric chloride. Laboratory tests of samples of these seeds, after the second treatment, showed a great deal of contamination.

On the other hand, 300 acres near Tifton, planted with seed which showed almost no organisms, not even saprophytes, in laboratory tests, produced absolutely disease-free plants. Part of this acreage was new land and part had been in other crops. Plants from this source grown in a northern state this summer were more free of early blight and retained their leaves better than those from all other sources.

It was impossible to evaluate the different kinds of seed treatment because of the varying degrees of effectiveness of what was supposed to have been the same treatment. In one case seed treated only once produced disease-free plants; in other cases twice-treated seed produced much disease. In fact in some cases the double treatment was less effective than none at all. Probable explanations are the presence of internal mycelium not affected by the treatment, recontamination, or lack of care in maintaining the strength

of solutions. However, seed treatment by all companies was much more productive of control than no treatment as of last year.

In regard to holdover evidence a field previously in tomatoes with much collar-rot in 1935 this year showed the disease again in about 0.5 percent of the plants. Another such field planted with cleaner seed showed no sign of any early blight symptom. The solanaceous weeds that might be carriers are few in this region and appear late in the season. The chief one, Solanum carolinense, was found in May, but showed no early blight spots. Jimson weed, Datura, was seen with the Alternaria crassa spots. There did not seem to be any evidence this year for survival of the early blight organism in either soil or weeds.

Bacterial spot (Bacterium vesicatorium): In 1935 there was hardly a field that did not show some spotting on leaves, but this year there was very little or none in most. It was not serious in any field. Seed treatment controlled this disease much better than it did the early blight. Here again the difference in effectiveness of treatments by different companies was very pronounced. The first spot was found about April 22 in a field on new land planted with seed that had been treated twice with mercuric chloride. The amount of disease increased somewhat, but not enough to cause rejection of the field. There was no evidence of holdover in old fields.

Bacterial canker (Aplanobacter michiganense): Not a case of this was found in any field, but it rarely shows on plants until nearer maturity. Reports of its occurrence on Georgia-grown plants came from Virginia and Maryland. In the one case that was traced the seed had been fermented and treated twice with mercuric chloride and planted in new land. Either fermentation is not always effective in eliminating the organism, or there is variation in the results of the methods used by different seed companies, as was the case with seed treatment.

Bacterial wilt (Bacterium solanacearum) was not observed until after the shipping season. Early in July it appeared on leftover plants in several fields. All infections seen were on upper parts of the plants and insects appeared to be rapidly disseminating the organism during this rainy period. It is difficult to understand why there should have been so much on tomato plants when practically no wilt appeared on tobacco in the same region. Reports of this disease were received from two northern States, so some infection of seedlings must have taken place before the season ended.

Southern blight (Sclerotium rolfsii) was not found on new land, but did occur in a few spots in fields previously in cultivation. If the mycelium or sclerotia are present on even one plant in a crate the whole lot will decay, especially if there is any delay in getting them out. However, the total loss from this disease amounted to a mere trace.

Root-knot (Heterodera marioni): A part of one field had been previously in watermelons, and wherever the hills had been the tomato roots showed nematodes. Other than this almost no root-knot was found.

Diseases in Fields Grown for Fruit

Not many tomatoes are grown commercially for sale fresh or for canning. This year about 2,500 acres were grown in Tattnall and Burke Counties and 1,500 in Mitchell and Douglas Counties. Other than this there were small plots of one acre or less.

Wilt (Fusarium bulbigenum lycopersici): Some wilt was found in almost every field inspected. In one Greene County garden and one in Clarke County the variety was Marglobe and still all the plants died at the bearing age. In other fields this variety, along with Pritchard and other resistant ones, showed some indication of disease but did not die.

Root-knot (Heterodera marioni) was found along with Fusarium wilt in many gardens and in some large fields in south Georgia, and in few cases was one found without the other.

Bacterial wilt (Bacterium solanacearum) was found in only a few instances in Tifton gardens and on seedling plant remnants. Most of the wilt seen even in southern Georgia was of the fungous type.

Blossom-end rot (physiological): The first part of the summer was very dry and at least half of the early crop was lost from this disease. A two-acre field in Clarke County, in spite of irrigation, lost 50 percent or more in July and early August. As soon as rains and cloudy weather appeared in middle August the rot stopped. Air humidity seemed to be just as important in control as soil moisture.

In the above field Fusarium bulbigenum lycopersici and Alternaria fasciculata followed the tissue break-down. A few fruits also showed Fusarium solani as a secondary organism.

Phoma rot (Phoma destructiva) was found only in one field in Tattnall County. The same field also had much nail-head spot and early blight. About 60 percent of the fruits were rotting in June.

Early blight (Alternaria solani): Almost none appeared in the early summer, but during the rains and hot weather of the middle period, it became the chief disease in almost every field inspected. From 20 to 75 percent of the leaves were destroyed, and in all such plants the upper part of the stems were heavily spotted. In fields showing no disease except

early blight there was no fruit spotting during the entire summer, but in October when the nights were cool, but before frost, about 30 percent of the fruits on the College farm developed smooth black spots of from 1 to 3 or 4 cm. in diameter near the stem end or on the sides. These spots produced typical spores in profusion.

Many boxes of growing tomato plants for garden planting were inspected in seed stores and on farms, and some early blight spotting was found in nearly all of them. The collar-rot phase was seen only in a few boxes. Late in September some seedling plants in Hall County, grown to be shipped to Florida, had collar-rot as well as higher stem cankers, and they were completely ruined. The only extensive collar-rot found on mature plants was in Tattnall County on plants grown in Florida, while plants in the same field grown near Cairo, Georgia, showed none.

Other possible hosts of Alternaria solani were sought. Very young pepper plants at Tifton and at Athens were found with typical early blight spots, but mature peppers adjacent to a badly blighted tomato field were not infected. In this same tomato field were many plants of Solanum carolinense, and they were watched during the summer, and so far no blight has appeared on them. Some Datura plants near this field showed only A. crassa. No leaf spotting was found on Physalis spp., and the only spots on Solanum nigrum were caused by a Cercospora. There does not seem to be natural infection on these weeds, at least under Georgia conditions.

There was much early blight on the late crop of white potatoes, but no field was found near enough to a tomato field to obtain any evidence of inter-dissemination.

Nail-head spot (Macrosporium tomato): In the Tattnall and Burke County fields in late June fully 60 percent or more of the fruits showed this spotting. It was complicated in some of the fields with bacterial spotting and with Phoma spot. An eight-acre field in Douglas County lost about 40 percent of the fruit from nail-head followed by rotting. All of these fields showed typical early blight on leaves and stems, and cultures from these spots and from nail-head spots on fruits produced Alternaria solani along with the species of Alternaria usually thought of as saprophytes. However, other fields in north Georgia were heavily infected with early blight and produced no fruit spotting.

Septoria blight (Septoria lycopersici) was serious in three small fields in Clarke County. In September the leaves were badly spotted. This disease appears only on the late crop, and this year there was much less than usual.

Bacterial spot (Bacterium vesicatorium): Only one field, in Clarke County near a woods, showed enough spotting on leaves and fruits to affect the yields seriously. A trace was found in many other fields, but always on the leaves and none on the fruits.

Gray leaf-spot (Stemphylium sclani): Small angular spots on leaves at Eatonton, Experiment, and Athens were covered with a Stemphylium sp. This was discovered only in a few fields in late August. Attempted recoveries from the Experiment leaves developed only the Stemphylium, but from the other places Bacterium vesicatorium also appeared. No comparisons or inoculations were made so it is impossible to say definitely that this is identical with the one described from Florida.

Leaf-roll (cause unknown): Two fields of late tomatoes, on the Horticultural Farm at Athens, one irrigated and on a hillside and the other in bottom land near a river, showed extreme leaf rolling in August and early September. It followed varieties rather than environmental differences. The Pritchard variety in both places was most seriously affected. At least two-thirds of the leaves were curled with some dwarfing, while Break-O-Day in the same situations showed almost no symptoms. Later early blight became so serious on all plants that the leaf-roll was not distinguishable.

Other diseases, often common in northeastern states, such as mosaic, streak, anthracnose, and bacterial canker were not seen in any of the inspections. (College of Agriculture, University of Georgia).

APPLE DISEASES IN PENNSYLVANIA IN 1936

R. S. Kirby, G. L. Zundel,
A. H. Bauer, and L. T. Denniston

The accompanying table 41 summarizes the occurrence of apple diseases in Pennsylvania in 1936 as determined by orchard inspection. A similar summary for 1935 was given on page 7 of this year's Reporter. (Pennsylvania Agricultural Experiment Station).

APPLE DISEASES IN PENNSYLVANIA IN 1936

R. S. Kirby, G. L. Zundel, A. H. Bauer, and L. T. Denniston

Table 41. Summary of apple disease survey in Pennsylvania, 1936.

Treatments or sprays	Number orchards surveyed	Number apples counted	Percentage of diseased apples								
			Scab	Brooks spot	Sooty blotch	Blotch	Black rot	Bitter rot	Apple rust	Quince rust	Total
Complete all sprays	95	46,300	.5	.04	.109	.2	.01	.01	.048	.02	1.
Partly sprayed	187	68,310	4.8	.4	1.43	.3	.1	.001	.051	.001	7.2
Unsprayed	36	4,020	36.2	5.2	29.87	2.8	3.	.2		.02	77.4
State total	318	118,630									
One spray ommitted:											
Delayed dormant	19	5,660	8.7	.5	.07		.04	.04			10.
Pre-pink	32	11,350	.8	.1	.14	.01	.08	.05	.026	.01	1.2
Pink	11	3,600	2.7	.9	.28	.41	.2		.083	.08	4.5
Petal fall	3	1,050	1.8	.2	1.04		.1				3.1
1st summer	3	600	3.	.8	1.16						5.
2nd summer	6	2,950	1.3	1.1	1.66		.03		.03	.03	4.
3rd summer	14	2,900	3.4	.4	3.19		.03		.03		7.1
All sprays but poor methods of spraying	9	2,500	18.7	.6	1.9	.04	.3				21.5

(Pennsylvania Agricultural Experiment Station)

APPLE DISEASES IN NORTH CAROLINA IN 1936

Luther Shaw

Introduction: The influence of abnormal weather conditions on a number of the major apple diseases was unusually evident in North Carolina during the season of 1936. During February, March, and early April, an excess of more than 8 inches of rain fell; during the latter part of April, and in May and June, there was one of the largest deficiencies in rainfall on record for the State; during July, August, and September rain periods were well distributed, but excessive precipitation occurred in July.

Two six-day survey trips, one in late April and one in early September, were made into the major apple-growing counties in the western part of the State. The same orchards were visited on both trips and records were made of the prevalence of seven major diseases, namely; blight, scab, bitter rot, black rot, blotch, rust, and bitter pit. Following are summaries of the notes made relative to the prevalence of the different diseases.

Blight (Bacillus amylovorus) caused practically no damage to apples in the mountain area of North Carolina. The absence of rain during the blooming period evidently effected a natural control of the disease. However, in the Piedmont and Coastal Plains areas, blossom blight was extremely severe on both apples and pears. In this area, the trees were in bloom before cessation of the rains in March and April. Twig blight was very light in these two areas. Evidently the extreme drought of May and June acted as a check in this stage of the disease.

Scab: Examinations of perithecia of Venturia inaequalis on overwintered leaves collected during the week of April 27 to May 1 revealed that very few of the ascospores were mature. Further, weather records showed that conditions conducive to ascospore discharge had not occurred since the first ten days of the month. Hence, it was evident that a major infection period had not occurred up to the week of the visit. Most of the apple varieties were then in the petal-fall stage. As already stated, dry weather continued through May and June. As a result of these conditions primary infections on the calyces, fruit, and foliage were held to a minimum. Conditions suitable for secondary spread of the fungus did not occur until July and August. However, primary infections were so limited that even on unsprayed trees, only a minor amount of scab developed on the fruits.

Bitter rot (Glomerella cingulata) was generally prevalent in September in orchards where sanitary control measures had not been practiced. In two orchards in Alexander County, bitter rot destroyed from 75 to 100 percent of the fruit of all varieties. A complete spray program was followed in each of these orchards but overwintered mummies were not destroyed.

Four other orchards were visited in which incomplete spraying and sanitary control measures were practiced. The loss from bitter rot in these orchards averaged approximately 5 percent. In orchards where good spraying and sanitation were practiced the loss was, on the average, less than 1 percent.

Black rot (Physalospora obtusa): Practically no infections on fruit by the black rot fungus were observed in the orchards visited in September but serious defoliation from leaf infections had occurred in a large number of orchards, especially where the summer sprays had been omitted. However, in one orchard in Wilkes County that received four summer applications of Bordeaux mixture, the black rot fungus caused heavy defoliation of Delicious and Stayman.

Blotch (Phyllosticta solitaria): Serious blotch was found in only one orchard. A consistent program of spraying and pruning had not been practiced in this orchard for the past five years. As a result of these poor practices an abundance of blotch cankers in the trees served as a yearly source of inoculum. Counts made on the fruit of five Red Limbertwig trees showed that 80 percent was infected with blotch, with an average of 5.5 lesions per fruit.

Bitter pit (non-parasitic) caused more damage in apple orchards in western North Carolina during the season of 1936 than it had caused during all of the previous five years. The disease was prevalent throughout the area on Delicious and Stayman. Counts made in six orchards in Wilkes and Alexander counties showed that 7 percent of the Delicious and 10 percent of the Stayman fruits had serious bitter pit. The wide variations in moisture conditions described above evidently constituted the major factor in the general seriousness of bitter pit during the current season.

Rust (Gymnosporangium juniperi-virginianae): A light foliage infection by the apple cedar rust fungus was found in only one orchard where the greatest amount of infection occurred on Rome Beauty. (North Carolina Agricultural Experiment Station).

LEAF RUST ON SCOTCH PINE IN NEW YORK

D. S. Welch

A needle rust causing severe injury to Scotch pine (Pinus sylvestris L.) was found in a five-year old plantation near Auburn, New York. The first observations of the fungus were made in May, 1936, at which time most of the aecia were still unopened, although damage to the needles was already apparent. When next seen on July 20, it was observed that plants of

Campanula rapunculoides growing in or near the plantation were very severely affected by a rust fungus identified as Coleosporium campanulae (Pers.) Lev.

While the proximity of the two host plants is not to be considered as proof that the fungus on the pine is Coleosporium campanulae, the circumstantial evidence points strongly in that direction. Inoculation experiments are under way to test the supposition that the associated fungi are identical. (New York (Cornell) Agricultural Experiment Station. Dec. 8).

NOVEMBER WEATHER

The following discussion and accompanying maps are taken from the Weekly Weather and Crop Bulletin for the week ending December 8, 1936.

The month of November 1936 was cooler than normal over most of the eastern half of the country and in the far Northwest, and warmer than normal in the far Southwest and in Central and Northern States between the Mississippi River and Rocky Mountains. Precipitation was very unevenly distributed. It was decidedly below normal over large areas, especially west of the Mississippi River.

Fig. 56 shows that the monthly mean temperatures were near normal in the Atlantic area and from 2° to 4° below normal between the Appalachian Mountains and the eastern Great Plains. In the interior of the Pacific Northwest the month was decidedly cold, the temperature averaging from 4° to 7° subnormal. On the other hand, over an area extending from North Dakota and eastern Montana southward to the southern Plains, thence southwestward to the Pacific Ocean, above-normal warmth prevailed, the greatest plus departure of temperature appearing in the northern Plains and south Pacific sections.

Fig. 56 shows also the southern limit of freezing weather during the month, and of sub-zero temperatures. Freezing occurred well southward over the Florida Peninsula and practically to the Gulf coast to the westward. In fact, temperatures of 32° or lower occurred in all parts of the country, except in Gulf coast sections and a narrow belt along the Pacific coast. Subzero temperatures were reported from the interior of the Northeast, at points in the extreme upper Lake region, and over a considerable northwestern area. The lowest reported from a first-order station was 16° below zero at Havre, Montana.

Fig. 57 shows that precipitation was above normal in the Ohio Valley, parts of the Lake region, and limited areas in the Southeast; also locally

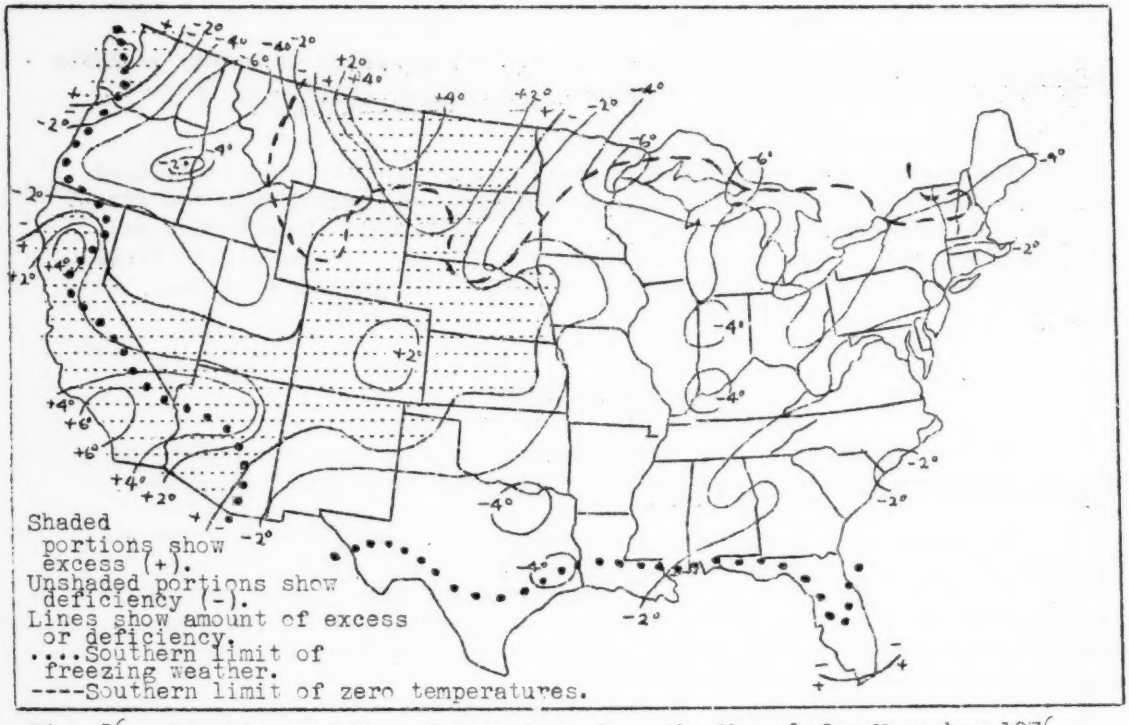

Fig. 56. Departure of Mean Temperature from the Normal for November 1936.

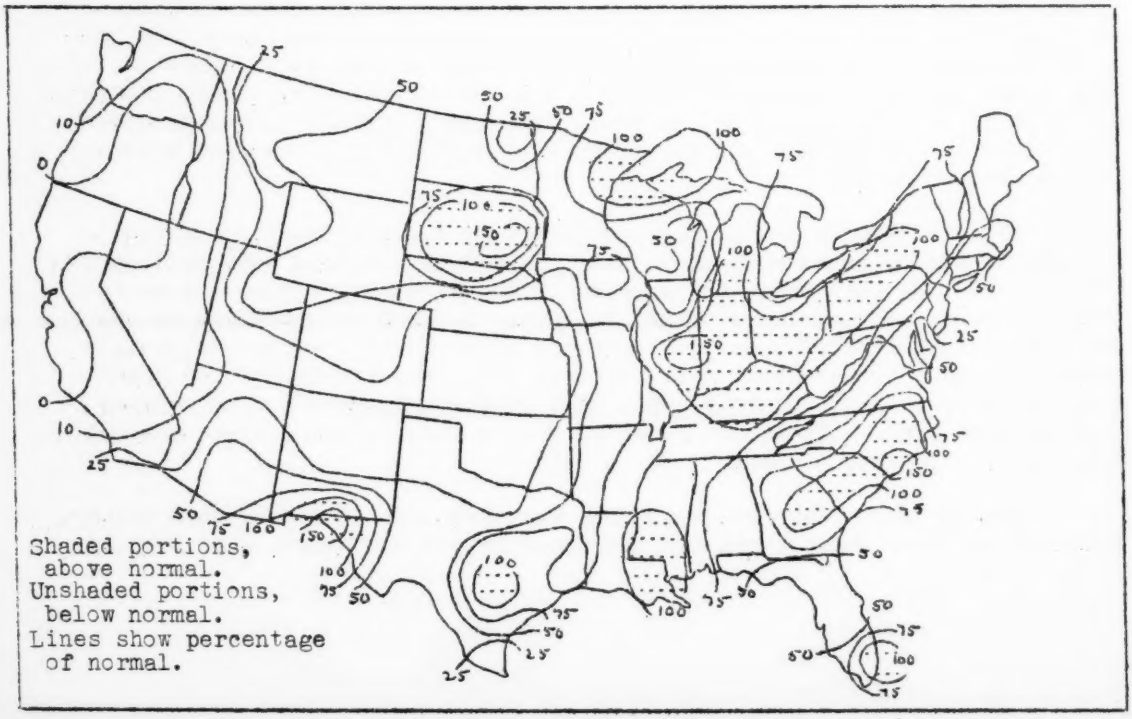

Fig. 57. Percentage of Normal Precipitation for November 1936.

in the west Gulf area and northern Plains, the latter principally in South Dakota and northern Nebraska. Elsewhere, the month was drier than normal, the deficiencies in precipitation being especially large in most of the western half of the country. In large sections of the southern Plains and in much of the far West there was practically no precipitation during the entire month.

THE FALL OF 1936

The following discussion and accompanying maps are taken from the Weekly Weather and Crop Bulletin for the week ending December 15, 1936.

The average temperature for the fall (September-November) of 1936 was quite similar to that for the same season in 1935, the means being near normal in nearly all sections of the country. (See Fig. 58) September was decidedly warmer than normal nearly everywhere, with substantial plus departures of temperatures throughout the interior valleys. October was comparatively warm in the more eastern and far western States, and somewhat cooler than normal in the interior valleys, while November had below-normal temperature in the eastern half of the country, and considerable variations from above normal to decidedly below in the western half; freezing weather was reported generally, except in the extreme South and the extreme West.

Following the unprecedentedly hot, dry summer of 1936, September brought generous rains to much of the interior which relieved droughty conditions over large areas, especially the Ohio and middle Mississippi Valleys and the southern Plains. However, during the last 2 months of the fall season precipitation in the Midwest was light, as a rule. At the beginning of the winter most States from the Great Plains westward were needing moisture.

Fig. 59 shows that, for the 3 months combined, precipitation was above normal over a wide belt extending from northern Texas, eastern New Mexico, and eastern Kansas northeastward, and also in parts of the Atlantic area. Over the western half of the country, except in a limited area of the far Southwest and locally in the northern Rocky Mountain section, precipitation was decidedly deficient. A large part of the far Northwest was extremely dry, with the totals ranging from less than 10 percent to scarcely half the normal amount. There were also rather large deficiencies in the northern Plains.

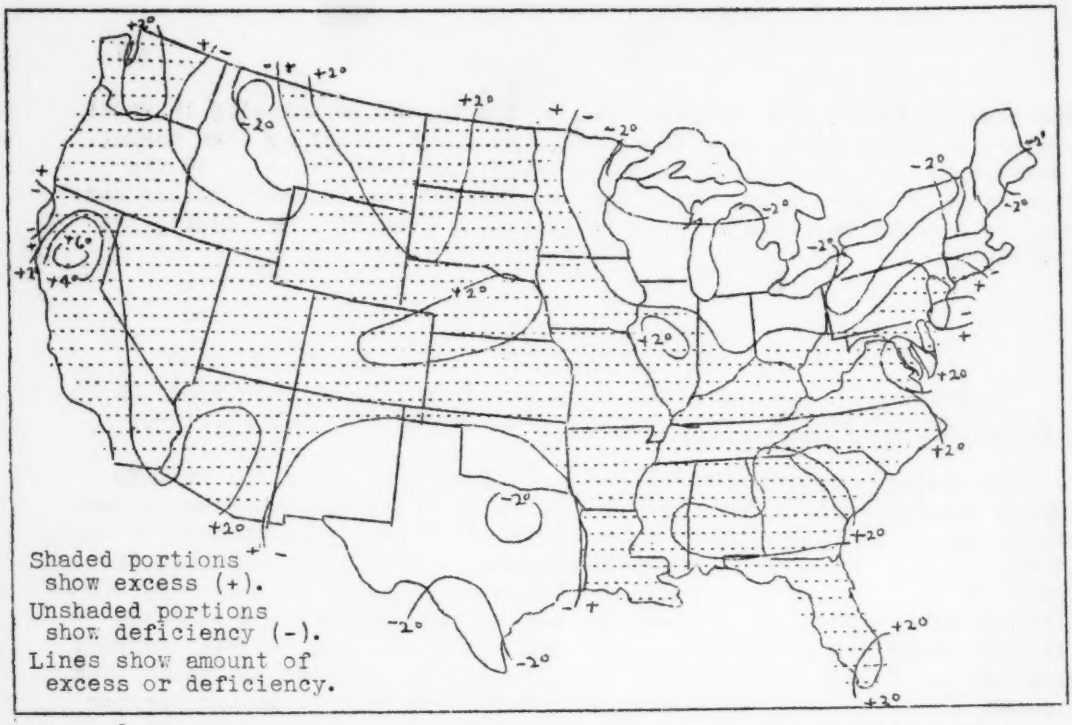

Fig. 58. Departure of Mean Temperature from the Normal for the Fall (September-November), 1936.

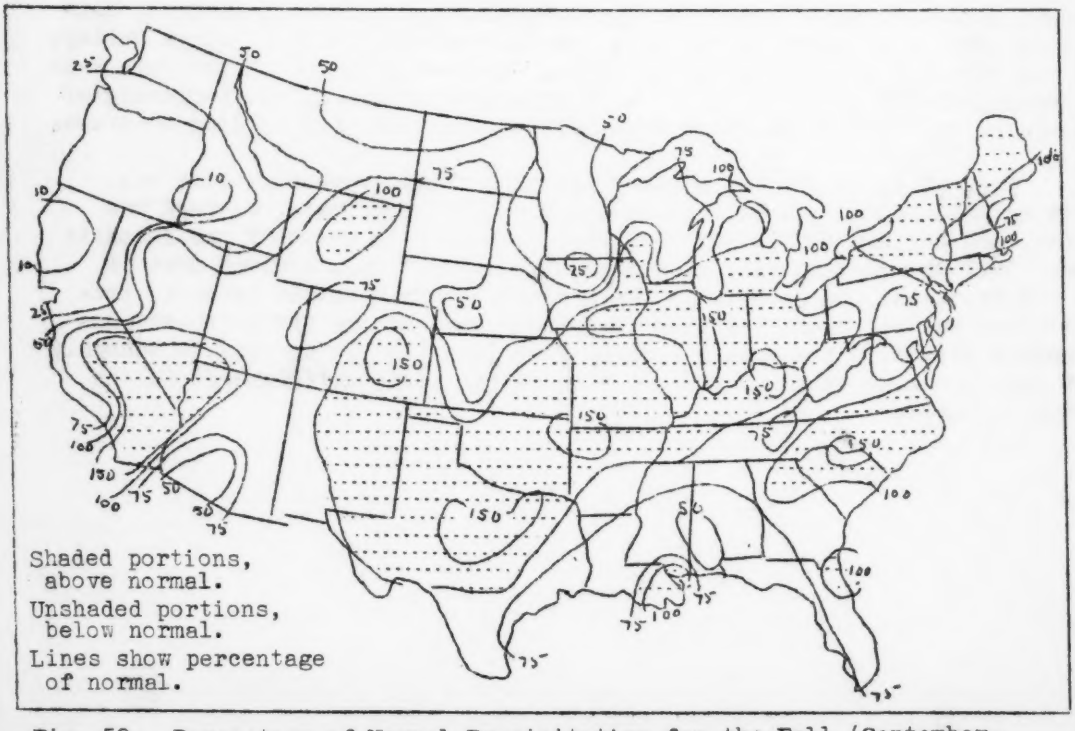

Fig. 59. Percentage of Normal Precipitation for the Fall (September-November), 1936.